Spring 2007

Spring 2007

NSU Oceanographic Center

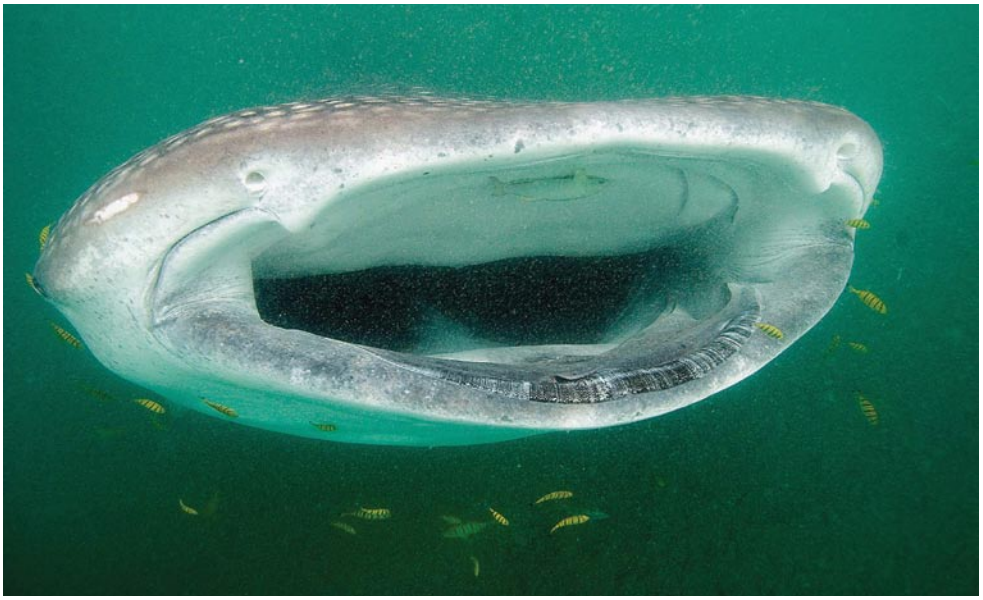
Nova Southeastern University
Oceanographic Center

Currents

Spring 2007 • Volume XXII, Number 2

Whale Sharks Tagged for Research

M.S. student **Matthew Potenski** recently completed five months of field research in Tanzania, on the east coast of Africa. During his time there, he observed and tagged whale sharks (*Rhincodon typus*) in the waters surrounding Mafia Island, Tanzania. Potenski works on a volunteer basis as a shark biologist for the New Jersey-based nonprofit organization, the Shark Research Institute (SRI—*www.sharks.org*). Potenski split time between living onboard the M/V *Kairos* (*www.thekairoscompany.com*), a French-owned, 300-ton, live-aboard dive vessel and on Mafia Island itself, at a compound owned by the Tanzanian office of the World Wildlife Fund (WWF—*www.panda.org*). WWF also provided funding for equipment, especially the pop-up archival (PAT) satellite tags to be deployed in the study.



A really big mouth—whale shark feeding (Photo by Matthew Potenski)

The M/V Kairos *(Photo by Matthew Potenski)*

Whale sharks have been discovered to aggregate in Kilindoni Bay off of Mafia Island, the southernmost island of the Zanzibar Archipelago in Tanzania. The island sits offshore from the Rufiji River delta, and the nutrients from the river runoff must collect in this area and feed the thick, green soup of phytoplankton that is prevalent in this area. Whale sharks are filter feeders, and migrate over huge distances, stopping in strategic spots to feed. They apparently discovered this veritable bonanza of plankton and started to exploit the resource as a stop in their travels. All the sharks here are juveniles, with individuals ranging in length from roughly 3 to 8 meters. While these are not small animals, the whale shark is the largest fish

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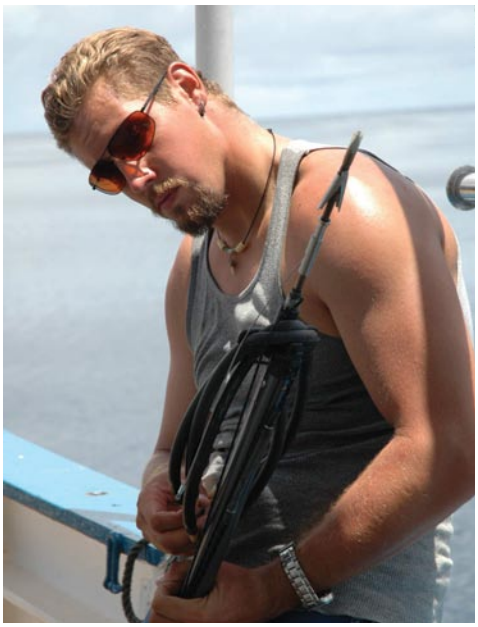
in the ocean and can attain sizes around 15–17 meters. These giants calmly swim along the surface with their wide mouths agape, gorging themselves on microscopic prey. They can be spotted by looking for their large, rounded dorsal fins breaking the surface, as well as their heads and tails bobbing up and down and sometimes breaking the surface. They are surprisingly graceful for their size, and seeing them underwater as they glide by in a flash of spots is truly an amazing experience not soon forgotten.

The goals of the study of whale sharks in Tanzanian waters is to characterize the population, determine migratory pathways, and add habitat use information to our overall understanding of whale sharks.

Visual ID tags and satellite telemetry tags were deployed to try and gain insights into their migratory patterns. The ID tagging also helped determine a base population number, while *in-situ* observations served to determine the demography of the population. Each whale shark has a spot pattern as unique as our fingerprints, and images were captured of each shark for photo identification. The images can be analyzed by software that makes a 2D referenced spot-map, and then compares multiple maps for overlap. The software is being used by whale shark monitoring programs across the Indian Ocean (Seychelles, Maldives, Mozambique, South Africa, and Australia) and a cooperative effort to create a database of shark images (and thus population estimate) for the entire ocean basin is currently being collected. Tags were attached to the whale shark via standard NMFS-style Casey tag dart anchors (albeit super sized for the whale sharks). The anchor was shot into the left dorsal of the whale sharks with a spear-gun using specially modified tagging heads on the spears. The skin in this area can be up to 10 inches thick and the methodology has proved to be minimally invasive to the sharks. The deployment of *in-situ* tags is required due to the fact that a whale shark cannot be captured to apply a tag like most shark species.

PAT satellite tags were also deployed. These tags remain on the shark for a set amount of time (2-, 8-, or 12-month intervals for this study) and record information about temperature, depth, and light intensity. At the end of the interval, the tags pop off the tethers, float to the surface, and beam all the data to the ARGOS satellite system, where it is made available to the researcher. The tags are a great way to increase our observation time of an animal that spends its life in a cryptic environment and, in limited use, has already caused us to totally rethink whale shark habitat use. The only drawback is the price—each tag costs $4,000 USD, and studies can get expensive quickly.



Matthew Potenski with speargun used in tagging

Tags showing on a young whale shark

The field season was a large success. Twenty-five whale sharks were marked with ID tags and thirty-three were identified from photos. Eight PAT tags were deployed on ID tagged individuals. Potenski also worked closely with WWF and the local community on Mafia Island to set up an ongoing whale shark survey program to look for whale sharks throughout the year. Potenski will return to Mafia Island in October for a six-month field season in year two of the research project.

Ecotourism for whale sharks has exploded across the globe. The magnificence of such large, distinctive animals, coupled with their calm demeanor and their feeding biology, which differs greatly from other sharks, makes them a huge attraction for dive operators. Snorkelers can safely approach and encounter these friendly creatures and many are moved to awe by their size and beauty. However, whale sharks are highly migratory, and unfortunately, still the victim of targeted fisheries in some areas of the world. At the last CITES conference, the whale shark was listed on Appendix II, meaning that it must be monitored and managed properly, but is not yet fully protected. Hopefully, whale sharks will be fully upgraded to Appendix I at the next conference and all international trade in whale sharks will be banned.

People on the Move

Professors **Charles Messing**, Ph.D., and **Richard Spieler**, Ph.D., and students in the Deep-Water Ecology of the Strait of Florida class loaded the *R/V Suncoaster* (Florida Institute of Oceanography) and departed Port Everglades on the evening of May 13 for an offshore, deep-water trawling and dredging expedition. Although the cruise was cut short by unexpectedly strong winds and rough seas, they made five very successful collections at depths ranging from about 215 to 425 meters. The Isaacs-Kidd midwater trawl, launched after dark to take advantage of the many invertebrates and fish that migrate toward the surface from deep water at night, brought up prambugs (the model for the alien in *Aliens*); krill; bizarre shrimp; a silvery, silver-dollar-size hatchetfish; a tiny, black dragonfish with a luminous chin lure; and a host of gelatinous plankton.

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Other News

Dan Rather Tapes Show on Coral Reefs at the Oceanographic Center

Dan Rather visited the NSU Oceanographic Center for a day in March to gather material for his television news show *Dan Rather Reports* on the cable/DirectTV channel HDNET. The show features field reports that include politics, international affairs, and the environment. The NSUOC segment aired on April 3. In researching a story on the fate of coral reefs, Rather and his staff became aware of the coral reef research being done by scientists of the NSU National Coral Reef Institute (NCRI), and of the upcoming 11th International Coral Reef Symposium coming to Fort Lauderdale in 2008 that NCRI is helping organize. Rather extensively interviewed **Richard Dodge**, Ph.D., OC dean, who is also executive director of the National Coral Reef Institute (NCRI). During his visit, Rather met many of the OC scientists and staff members.

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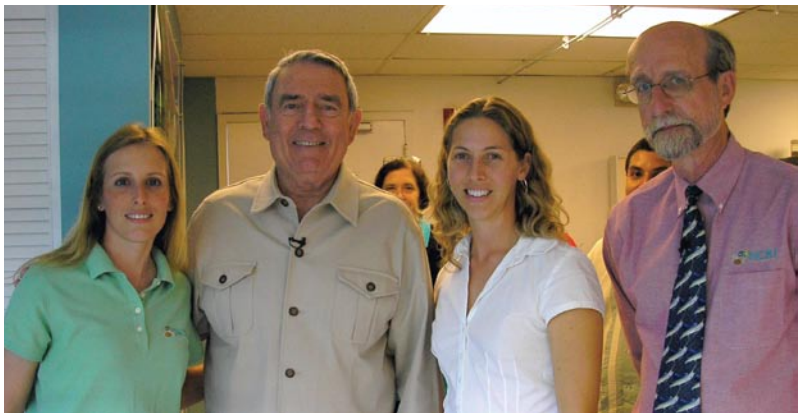
Dan Rather interviews Richard Dodge, NSUOC dean

The interview equipment being set up in the lobby of the OC



Dan Rather is flanked by (L–R) Ph.D. candidate Abby Renegar and researcher Alison Moulding, Ph.D., in the coral lab. Dick Dodge looks on.

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Three successive hauls at greater and greater depths with the otter trawl brought up seastars; urchins; crabs; sea anemones; thumbnail squid; brilliant yellow and orange dragonets; a wide-mouthed goosefish the size of a large frying pan; pink, shovel-nosed, armored searobins; a vertically striped boarfish that looked like a card-deck diamond; blind electric rays; and little, beautifully patterned sharks called chain dogfish. The final haul, made at the foot of the Miami Terrace with the heavy-duty Cape Town dredge, brought up chunks of ancient terrace limestone blackened by deposits of the mineral phosphorite, fan sponges, lace corals, snake stars, and a giant orange sea spider almost a foot across. The class will spend next weekend sorting through the catch, identifying as many creatures as possible, and adding them to the lab's collection.

NCRI faculty member **Sam Purkis**, Ph.D., gave an invited keynote presentation at the European Remote Sensing conference (EARSeL) held April 23–25 in the historic Belgium city of Bruges. The presentation was entitled, "Remote sensing the statistics of coral reef landscapes: The pattern in the pages," and highlights the work Purkis has been doing on the fractal properties of coral habitats.

M.S. student **Meghan Bills** attended the Southeast and Mid-Atlantic Marine Mammal Symposium (SEAMAMMS) March 16–18, at the Duke University Marine Lab in Beaufort, NC. Bills presented a poster entitled "Temporal and Spatial distribution of the Atlantic Bottlenose Dolphin (*Tursiops truncatus*), along the Northwest Atlantic Coastline" that describes the preliminary results of her M.S. thesis research. Co-Authors on the poster were Lance Garrison, Ph.D., of the NOAA Fisheries Southeast Fisheries Science Center in Miami, FL, and Edward O. Keith, Ph.D., of the NSUOC.

During a break in the proceedings, Sam Purkis (L) discusses reef remote sensing systems with Tony Vanderstraete from the University of Gent, Belgium.

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After the interview, he was shown the coral laboratory, where he was informed of the coral reproduction/restoration project that was taking place. He was shown maps of the coastline and how close the reefs are to Port Everglades. Dodge explained that, due to the poor placement of the anchorage sites, ships have drifted into the reefs, causing groundings that destroy the coral.

Rather also marveled at the picture of ancient star coral that was discovered in the waters south of the Port Everglades Inlet in 2005. The coral had been dated by Ph.D., candidate **Kevin Helmle** to at least 1694, making it possibly the oldest living animal in southeast Florida.

Following the interview and tour of the labs, Rather was treated to lunch provided by the NSU catering service and got to meet many faculty and staff members and students of NSUOC.

Coral Lab Has Babies!

Saturday night, May 12, the first captive coral spawning occurred in the NSUOC's new outdoor coral husbandry system. The spawning yielded larval *Porites astreoides*, which were collected and transferred to settlement tanks in the Coral Ecology Laboratory, where experiments to determine preference for settlement substrate will take place.

A topside view of "parent" Porites asteroids *coral*

The coral husbandry system, which has made captive coral spawning a possibility at the NSUOC, is composed of four large raceways holding more than 450 gallons each, a 500-gallon holding tank, and a 10' tall protein skimmer. The system was fabricated and constructed over the past few months by **Alison Moulding**, Ph.D., and research assistants **Abby Reneger** and **Adam St. Gelais**.

Alison Moulding checks on the corals

The parent *P. astreoides* colonies were collected from reefs off Broward County on May 11 and placed in the outdoor system inside specially constructed larval collection buckets. Each of the 10 buckets has its own water inflow and an overflow into a plastic container with 120-micron mesh sides. When larvae are released by the colony, they flow out of the bucket and into the mesh cup where they can be collected.

Larval release is synchronized with lunar cycles, and *P. astreoides* is known to release larvae nocturnally a few days before or after the new moon, primarily in April and May. Each morning, the collection cups are checked for larvae, which are brought into the lab if present.

Once in the lab, the larvae are individually separated from the collection cups and divided between experimental settlement tanks as needed. Different substrate choices will be provided for the larvae, in hopes of determining settlement preferences.

As the spawning season progresses, Moulding plans on attempting the same techniques with a number of other species including *Montastraea cavernosa* and *Siderastrea siderea*. Captive coral spawning holds exciting potential for reseeding coral reefs with captive-raised colonies.

Adam St. Gelais carefully transfers the larvae for placement in settling tank.

Oceanographic Center's Guy Harvey Research Institute Billfish Research Receives Extensive National and International Media Coverage

A scientific study published in the journal *Bulletin of Marine Science* by **Mahmood Shivji**, Ph.D., director of the Guy Harvey Research Institute, and his graduate students and collaborators from NOAA Fisheries in Miami has received national and international coverage in more than 120 media outlets. His genetics research validated the existence of a previously unrecognized billfish species, (roundscale spearfish), in the western Atlantic ocean. The study showed that this species is virtually indistinguishable from the fabled white marlin that is threatened with extinction due to over-fishing.

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Grants and Awards

On May 15, **Edward O. Keith**, Ph.D., was awarded an NSU President's Faculty Research and Development Grant for his proposal entitled "Field Testing of Sonar Fishfinders for Manatee Avoidance Technology." Watercraft-related mortality is the major known cause of manatee mortality in Florida (25 percent of all mortality between 1977 and 2006). This project aims to develop technology designed to alert vessel operators to the presence of manatees in sufficient time for them to either reduce speed or take evasive action, thus reducing vessel-related manatee mortality. Interphase Technologies (Soquel, CA) and Techsonic Industries, Inc. (Eufaula, AL) both manufacture a number of different sonar units, and these will be evaluated and modified to develop such a manatee alert system.

Due to difficulties in obtaining the requisite permits to conduct such testing on free-living manatees in the United States, the field testing will be conducted in Mexico in collaboration with David Leon Olivera, Ph.D., at the Universidad Juarez Autonoma de Jalisco, in Villahermosa, Mexico. Most of the work described in this proposal will be conducted by a graduate student at the NSU Oceanographic Center, and the results of these investigations will comprise this student's master's thesis. Undergraduate students from the Farquhar College of Arts and Sciences will participate in the field testing of the sonar units at the NSUOC, using simulated manatee targets fabricated from wood and plastic. Total funds awarded under this grant are $10,000, one-half coming from NSU and one-fourth each coming from the budgets of **Richard Dodge**, dean of the Oceanographic Center, and Don Rosenblum, dean of the Farquhar College of Arts and Sciences. The Marine Industries Association of South Florida (MIASF) has provided an additional $1,600 in matching funds to support this project.

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The close resemblance between the two species has likely caused species misidentifications in the catch records. Consequently, previous population estimates of the already diminished white marlin stocks may have been overestimated. This discovery of the roundscale spearfish and potential for species mix-ups has triggered new population assessments of the white marlin to determine if it should be prohibited from fishing by listing it under the U.S. Endangered Species Act.

NSUOC's research has been reported in worldwide media (Germany, the United Kingdom, South Africa, Canada, and Romania), including prominent U.S. venues such as *The Washington Post*, National Public Radio (*All Things Considered* Show), and *Science* magazine.

White Marlin (Photo by Guy Harvey)

Roundscale spearfish (Photo by G. Hinteregger)

Many of the media reports are available on the Guy Harvey Research Institute Web site: *www.nova.edu/ocean/ghri/*.

Oceanographic Center Adjunct Professor Receives Innovator of the Year award in Iowa.

Steffen Schmidt, Ph.D., professor of political science at Iowa State University and adjunct professor at NSUOC has been selected for the 2007 Innovator of the Year Award by the Iowa Distance Learning Association. These awards are given to "individuals or organizations for contributions to distance learning through outstanding teaching, program design and development, innovation in methods, technique, technology, and advocacy." The announcement of the award said "Steffen is a pioneer in distance learning, especially Web-based teaching and learning. He is richly deserving of this award for his tireless work on behalf of distance education." He received his award at the annual IACON conference held in Cedar Rapids, Iowa on April 20.

Schmidt has worked with the center for many years on general issues related to distance learning programs, pedagogy, policy, and technology. He developed and teaches the NSUOC's distance courses on International Integrated Coastal Zone Management and Coastal Policy. He has also worked with many students each year on Coastal Zone Management and Policy internships, many of these on ships and in international venues, and has supervised research projects for OC capstone reviews.

Steffen Schmidt at his weekly radio show, Dr. Politics, *for C-Span*

Whole Foods Donates Money to Sea Turtle Program

Through community involvement and a commitment to serve as stewards of their environment, each year Whole Foods Market® pledges to donate a portion of their proceeds to nonprofit and educational organizations. This year, Whole Foods Market in Coral Springs, Florida, chose to contribute 5 percent of their daily net sales on April 4 to the Broward County Sea Turtle Conservation Program, managed by NSUOC. As a result, a check in the amount of $1,785.60 was presented to the program manager on April 11. The donation will help support funding for sea turtle nesting surveys on the 24 miles of beaches within Broward County during the nesting season. At least three times a year, individual Whole Foods Market stores contribute 5 percent of a particular day's net sales to a local or regional nonprofit or educational organization.

The Broward County Sea Turtle Program promotes the conservation of sea turtles and their protection on Broward's nesting beaches, as well as the marine environment, through education and awareness programs. One major focus of the awareness programs is educating the public regarding the importance of sea turtle protection by encouraging the implementation of turtle-friendly lighting throughout the coastal communities in Broward County. The Broward County Sea Turtle Program also conducts field efforts that include surveys of sea turtle nesting activity. Data collected from these survey efforts is compiled each year into a Technical Report submitted to the county. The combined data collection efforts of the Broward County Sea Turtle Program with those of other sea turtle programs throughout the state are used to determine the status of Florida's nesting sea turtle populations.

Female loggerhead sea turtle

(L–R) Stefanie Ouellette, Broward County Sea Turtle Conservation Program project manager; Jonny Rose, Whole Foods Market marketing specialist; Michele Blackburn, Broward County Sea Turtle Conservation Program assistant project manager

Guy Harvey Research Institute (GHRI) benefits from the Miami Billfish Tournament.

The Yahama Contender Miami Billfish Tournament (YCMBT) board of directors has shown their support for NSUOC's Guy Harvey Research Institute by donating $5,000 to GHRI to continue shark and billfish research. GHRI researcher, Jennifer Magnussen also received a $1,000 scholarship from the tournament to support her research. Guy Harvey served as the official artist of the YCMBT, creating an original painting to be used as the tournament artwork

The Yamaha Contender Miami Billfish Tournament is a nonprofit fishing tournament, whose proceeds benefit marine conservation and enhancement programs. The YCMBT celebrated its 25th anniversary this year!

From left: Wendy Wood, YCMBT director and administrative coordinator, National Coral Reef Institute (NCRI); Terry Guthrie, YCMBT director; Mahmood Shivji, Ph.D., director of GHRI; Juan Comendeiro, YCMBT director.

Oceanographic Center Hosts Meeting Concerning Water Pollution

The National Coral Reef Institute (NCRI) hosted the biannual Technical Advisory Committee (TAC) meeting for the Land Based Sources of Pollution (LBSP) and Water Quality Working Group of the Southeast Florida Coral Reef Initiative (SEFCRI). It was held on May 24–25 at the Oceanographic Center.

Attending the meeting were members of the TAC, as well as the LBSP Advisory Committee and interested members of the public. The TAC is composed of representatives with expertise in pollution and water quality from federal agencies—including NOAA, EPA, and USGS—as well as state officials and industry scientists. Universities represented included NSU, University of Miami, FIU, and College of Charleston. The advisory committee is composed of resource management agency representatives and other experts, including those from the Florida Department of Environmental Protection (DEP), South Florida Water Management District, and Broward County.

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MASTERCURRENTS
INSTITUTE OF MARINE AND COASTAL STUDIES

Summer Term Courses

Check the Web site for course descriptions
July 2–September 14

Marine Chemistry, OCOR-5606
Instructor: Curt Burney, Ph.D.

In-house Elective TBA

Field Courses

Tropical Marine Fish Ecology
CZMT-0690/MEVS-5000/OCMB-6120
Instructor: Richard Spieler, Ph.D.

Alaskan Coastal Ecology or Food Webs
Instructor: Amy Hirons, Ph.D.

Taxonomy of Marine Invertebrates
OCMB-6085
Instructor: Charles Messing, Ph.D.

Marine Protected Areas
CZMT-0940/OCMB-8160
Puerto Morelos, Mexico
July 1–8, 2007
Instructor: Jennifer Rehage, Ph.D.

Distance Courses

Go to *www.nova.edu/ocean/disted.html* for information

M.S. degree specialties are marine biology, coastal zone management, and marine environmental science. Each course carries three credit hours or may be audited. Tuition is $639 per credit hour (50 percent less for audit). Classes meet once a week, from 6:30 to 9:30 p.m., at the Oceanographic Center (unless otherwise specified.) Registration ($25 fee) starts June 11 and runs through July 6 and takes place at *www.webstar.nova.edu* or at the Oceanographic Center. Classes are 12 weeks in length. For further information, call Richard Spieler or Melissa Dore at (954) 262-3610 or 800-396-2326, or email *imcs@nsu.nova.edu*. More information can be found at the Web site *www.nova.edu/ocean*.

Publications

Arena, P.T., L.K.B. Jordan, and R.E. Spieler, (2007). Fish assemblages on sunken vessels and natural reefs in southeast Florida, U.S.A. *Hydrobiologia*. 580: 157–171.

Fahy, D.P., R.E. Spieler, and W.C. Hamlett, (2007). Preliminary Observations on the reproductive cycle and uterine fecundity of the yellow stingray, *Urobatis jamaicensis* (*Elasmobranchii: Myliobatiformes: Urolophidae*) in southeast Florida, U.S.A. *The Raffles Bulletin of Zoology*, Supplement No. 14: 131–139. From the *Proceedings of the 7th Indo-Pacific Fish Conference*.

Levesque, J.C. and D.W. Kerstetter. (2007). First observations on the re-established southeast Florida recreational swordfish tournament fishery. *Florida Scientist*. 70(3): 284–296.

Papastamatiou, Y.P., S.J. Purkis, and K.N. Holland (2007). The response of gastric pH and motility to fasting and feeding in free swimming blacktip reef sharks, *Carcharhinus melanopterus*. *Journal of Experimental Marine Biology and Ecology*. 345: 129–140.

(Continued from page 6)

Richard Dodge, Ph.D., NSUOC dean and NCRI executive director, serves on the TAC. Many members of the Oceanographic Center staff and faculty attended the meeting.

Presentations included "Human Fecal Indicator Bacteria and Pathogenic Viruses in Offshore Reefs and Human Recreational Risk in Nearshore Waters of the Florida Keys" and "Florida Oceans and Coastal Resources Council Update" by Steven Wolfe, DEP. In working closely with SEFCRI, NCRI continues its liaison and participation with the LAS (Local Action Strategy) groups of the U.S. Coral Reef Task Force Southeast Florida Action Strategy Team (SEFAST).

(L–R) Nancy Craig, Ph.D., Broward County Water Quality Department DEP; Joseph Boyer, Ph.D., Southeastern Environmental Research Center, FIU; Richard Dodge, NSUOC; Fred McManus, Environmental Protection Agency; and Ken Banks, Broward County DEP, taking a break from the meeting

Seminars and Defenses

Seminar

S. Fred Singer, Ph.D., president, Science and Environmental Policy Project, "Some new results about climate change: The UN-IPCC vs. the US-CCSP." May 23.

Thesis

Nicole R. Stephens, "Stony coral transplantation associated with marine construction activities." Committee: David Gilliam, Ph.D.; Richard Dodge, Ph.D.; and Lou Fisher, (Broward County Dept. of Planning and Environmental Protection). March 23.

Erin Christine Hodel, "Histopathological assessment and comparison sedimentation and phosphate stress on the staghorn coral, *Acropora cervicornis*." Committee: Bernardo Vargas-Angel, Ph.D.; (JIMAR, UH); Bernhard Riegl, Ph.D.; and Curtis Burney, Ph.D. April 20.

Peter Gaube, "Statistical Analysis of Eight Years of Ocean Color and SST Data in the Tropical Pacific." Committee: Sean Kennan, Ph.D.; Alexander Soloviev, Ph.D.; and Alexander Yankovsky, Ph.D. June 6.

Capstone

Rosa Laucci, "The phylogeny, biology, and conservation status of freshwater stingrays (Family Potamotrygonidae) in South America and recommendations for future conservation." Committee: Richard Spieler, Ph.D., and Demian Chapman, Ph.D., March 27. ***(Laucci dedicated her capstone to Aidan Martin who passed away unexpectedly in February. Martin was an adjunct professor who taught "Biology of Sharks and Rays" through NSUOC's distance learning program.)***

Alastair G. Hebard, "The role of marine education on the creation, effectiveness, and sustainability of marine protected areas." Committee: Steffen Schmidt, Ph.D.; Keith Ronald, Ph.D.; and Jane Dougan. April 24.

Kristin Nugent, "A review of the significance of herbivory structuring coral reef ecosystems." Committee: James Thomas, Ph.D., and Curtis Burney, Ph.D., April 27.

Brenda Garza, "Non-Framework Coral Communities in the Gulf of California, Mexico" Committee: Bernhard Riegl, Ph.D., and Sam Purkis, Ph.D., May 21.

Karen Schanzle, "Magnetoreception in marine organisms with emphasis on bacteria, fish, sea turtles, and cetaceans." Committee: Pat Blackwelder, Ph.D., and Edward Keith, Ph.D., June 4.

Kristi A. Dement, "A look at Fibropapillomatosis in *Chelonia mydas*, the Green Turtle." Committee: Curtis Burney, Ph.D., and Edward Keith, Ph.D., June 13.

Juan Carlos Levesque, "A preliminary mako (*Isurus spp.*) shark catch investigation of the U.S. pelagic longline fishery (1992–2005) and a comprehensive review of the shortfin mako (*Isurus oxyrinchus*) and the longfin mako (*Isurus paucus*) shark. Committee: David Kerstetter, Ph.D., and Richard Spieler, Ph.D., June 18.

Alastair Hebard (L) shaking hands with Steffen Schmidt, following Hebard's defense

Geographic distances and distance study came together on April 24 at the Oceanographic Center, when **Alastair Hebard**; **Steffen Schmidt**, Ph.D.; and **Jane Dougan** joined other faculty and staff members and students for Hebard's capstone presentation towards his M.S. in Coastal Zone Management. Hebard journeyed from his home in Hawaii to present in person. Capstone committee supervisor Schmidt traveled from his base at Iowa State University, and Jane Dougan, coordinator of distance learning, flew in from Toronto, Canada. Unfortunately, committee member Keith Ronald had recently returned to Ontario from Florida and was unable to attend.

Hebard gave an engaging and thorough illustrated presentation on "The Role of Marine Education on the Creation, Effectiveness, and Sustainability of Marine Protected Areas," with a particular focus on the Hawaiian Islands National Marine Sanctuary Program. The presentation gave rise to interested discussion, and he ably fielded a number of questions from committee members and others in the audience. During his period of study with NSUOC, Hebard was able to take advantage of the flexibility of the distance M.S. program, completing the majority of his courses online, but also choosing to spend at least one term of study on-site, taking face-to-face courses. Warm congratulations from all of us, Alastair Hebard, and please don't stay "at a distance." We look forward to hearing of your achievements in the years to come.

Ph.D. Degree Offered

The Oceanographic Center offers a doctoral degree in oceanography/marine biology. The program requires a minimum of 90 credits beyond the baccalaureate. At least 48 credits must consist of dissertation research, and at least 42 credits must consist of upper-level coursework. Required courses include the four M.S. core courses. Other upper-level coursework is usually in the tutorial mode with the major professor. Tuition is $4,365 per quarter.

Alumni News

Neil Hammerschlag (2004, MB) is currently pursuing his doctoral degree at the University of Miami, Rosensteil School for Marine and Atmospheric Science. His research focuses on the community ecology of mangrove fishes as well as on the foraging behavior and ecology of marine predators, particularly sharks, and how they interact with their prey and the physical environment. While pursuing his degree at NSUOC, Hammerschlag worked in False Bay, South Africa, where he studied predator-prey relationships between white sharks and Cape fur seals for his master's degree thesis.

Hammerschlag currently co-directs the South Florida Student Shark Program (SFSSP), which supports student career development in a variety of natural science disciplines, while promoting the conservation of coastal Floridian shark species, mangrove fish habitats, and the Florida watershed through service learning, education, and research. The SFSSP is a partnership between the Southern Florida Chapter of the Explorers Club, the NOAA Living Marine Resources Cooperative Science Center, and the Herbert W. Hoover Foundation. As part of the program this past year, 150 high school and university students traveled to key sites in and around Biscayne and Florida Bay, where they sampled sharks and fishes. The program was featured on the front page of the *Miami Herald* in March 2007.

During 2006, Hammerschlag helped create a shark conservation exhibit at the Miami Museum of Science where his photos and videos where displayed for the summer. This past January, he helped bring ***Sharks 3D Imax*** to the Fort Lauderdale Museum of Science, and gave a presentation to the public at its premier. To follow or get involved with his current projects and conservation efforts, visit his personal Web site: *www.neil4sharks.org.*

Hammerschlag with a nurse shark

Recent Publications:

- **Hammerschlag, Neil**. 2004. A review of osmoregulation in freshwater and marine elasmobranchs. pp. 35–41. In: R.A. Martin and D. MacKinlay (ed.) Proceedings of *the American Fisheries Society, Fourth International Congress on the Biology of Fish*, Manaus, Brazil.
- **Hammerschlag, Neil**. 2006. Osmoregulation in Elasmobranchs: A review for fish biologists, behaviorists, and ecologists. *Marine and Freshwater Behaviour and Physiology* 39(3): 209–228.
- **Hammerschlag, Neil** and Chris Fallows. 2005. Galapagos sharks (*Carcharhinus galapagensis*) at the Bassas da India atoll: first record from the Mozambique Channel and possible significance as a nursery area. *South African Journal of Science* 101: 375–377.
- **Hammerschlag, Neil**, R. Aidan Martin, and Chris Fallows. 2006. Effects of environmental conditions on predator-prey interactions between white sharks (*Carcharodon carcharias*) and Cape fur seals (*Arctocephalus pusillus pusillus*) at Seal Island, South Africa. Environmental Biology of Fishes 76: 341–350.
- Martin, R.A., **Hammerschlag, Neil**, Ralph Collier, and Chris Fallows. 2005. Predatory Behavior of White Sharks (Carcharodon carcharias) at Seal Island, South Africa. *Journal of the Marine Biological Association of the UK*, 85: 1121–1135.

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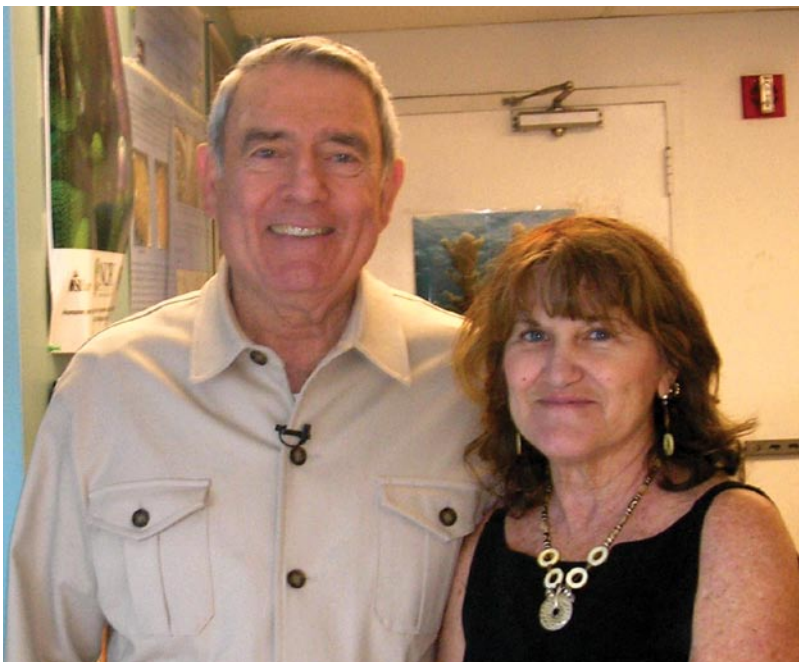
Currents, Spring 2007



Dan Rather and Kathy Maxson, OC librarian and editor of Currents.

Neil Hammerschlag and tiger shark (Photo by Eric Chang)

Editor: **Kathy Maxson**

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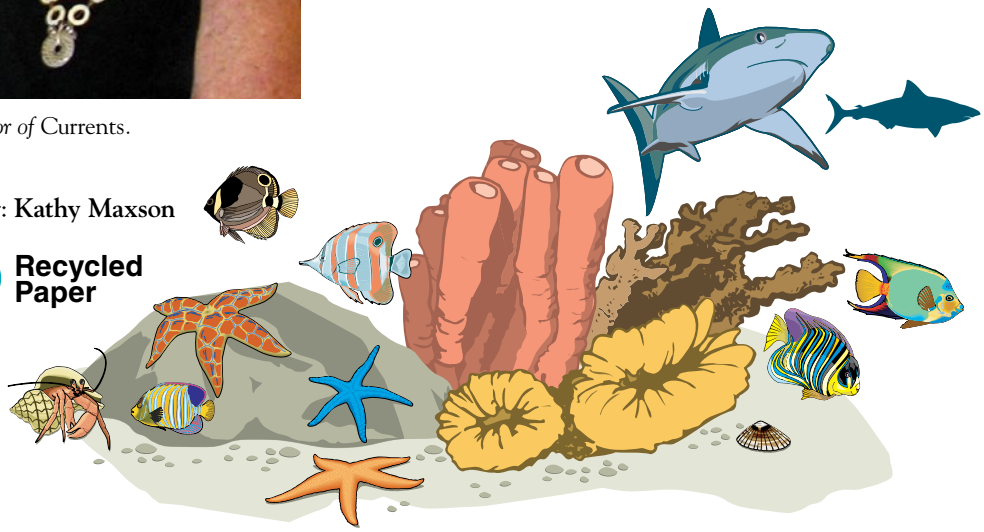

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